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14. ABSTRACT This is the final report for our DURIP grant entitled "Apparatus for Laser Slowing and cooling of Molecules". We have successfully acquired and assembled all parts for a new cryogenic molecular beam source, and recently used the source for preliminary work on laser cooling of a new molecular species, TIF. We have also successfully acquired and assembled the parts for a custom laser system, which produces long (~200 microsecond), single-frequency pulses with energy ~1.1 Joules at 1064 nm and/or ~0.4 Joules at 532 nm. We have acquired all parts for producing tunable laser pulses based on optical parametric amplification of an external cavity diode laser with this					
15. SUBJECT TERMS Laser cooling; ultracold molecules; pulsed laser					
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Report Title

Final Report: Apparatus for laser slowing and cooling of molecules

ABSTRACT

This is the final report for our DURIP grant entitled "Apparatus for Laser Slowing and cooling of Molecules". We have successfully acquired and assembled all parts for a new cryogenic molecular beam source, and recently used the source for preliminary work on laser cooling of a new molecular species, TIF. We have also successfully acquired and assembled the parts for a custom laser system, which produces long (~200 microsecond), single-frequency pulses with energy ~1.1 Joules at 1064 nm and/or ~0.4 Joules at 532 nm. We have acquired all parts for producing tunable laser pulses based on optical parametric amplification of an external cavity diode laser with this system, and assembled all but the final, yet-to-be-tested stage.

Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:

(a) Papers published in peer-reviewed journals (N/A for none)

Received

Paper

TOTAL:

Number of Papers published in peer-reviewed journals:

(b) Papers published in non-peer-reviewed journals (N/A for none)

Received

Paper

TOTAL:

Number of Papers published in non peer-reviewed journals:

(c) Presentations

APS DAMOP meeting, May 2016: Abstract: K1.00165 : Towards Stimulated-Force Slowing of SrF Molecules

Gordon Conference on Atomic Physics, June 2015: Towards Stimulated-Force Slowing of SrF Molecules

Number of Presentations: 0.00

Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):

(d) Manuscripts

Received Paper

TOTAL:

Number of Manuscripts:

Books

Received Book

TOTAL:

TOTAL:

Patents Submitted

Patents Awarded

Awards

Graduate Students

NAME	PERCENT SUPPORTED	Discipline
Eustace Edwards	0.00	
FTE Equivalent:	0.00	
Total Number:	1	

Names of Post Doctorates

NAME	PERCENT SUPPORTED
Eric Norrgard	0.00
FTE Equivalent:	0.00
Total Number:	1

Names of Faculty Supported

NAME	PERCENT SUPPORTED	National Academy Member
David DeMille	0.00	
FTE Equivalent:	0.00	
Total Number:	1	

Names of Under Graduate students supported

NAME	PERCENT SUPPORTED
FTE Equivalent:	
Total Number:	

Student Metrics

This section only applies to graduating undergraduates supported by this agreement in this reporting period

The number of undergraduates funded by this agreement who graduated during this period: 0.00

The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields:..... 0.00

Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale):..... 0.00

Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense 0.00

The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields: 0.00

Names of Personnel receiving masters degrees

NAME

Total Number:

Names of personnel receiving PHDs

NAME

Total Number:

Names of other research staff

NAME

PERCENT SUPPORTED

FTE Equivalent:

Total Number:

Sub Contractors (DD882)

Inventions (DD882)

Scientific Progress

For this equipment grant, we have successfully acquired and assembled all parts for a new cryogenic molecular beam source, and recently used the source for preliminary work on laser cooling of a new molecular species, TIF. We have also successfully acquired and assembled the parts for a custom laser system, which produces long (~200 microsecond), single-frequency pulses with energy ~1.1 Joules at 1064 nm and/or ~0.4 Joules at 532 nm. We have acquired all parts for producing tunable laser pulses based on optical parametric amplification of an external cavity diode laser with this system, and assembled all but the final, yet-to-be-tested stage.

Technology Transfer